of 30,000*l.* free (in the latter case) of legacy duty, on condition that the college becomes incorporated in the University on terms similar to those on which the gift of the Drapers' Company has been made, and satisfactory to Sir Michael Foster and two other persons to be named hereafter.

The Senate of the University has decided to devote the grant of 10,000*l.* by the London Technical Education Board to the following objects, subject to the approval of the Board and to the result of negotiations with the various institutions interested:—

(1) To found two professorships and two assistantships in chemistry; (2) to organise the teaching of German in London by appointing two professors and three readers. The classes will be held at the colleges and polytechnics, but the fees will be paid into a central fund, and the whole staff will be under the direction of the University; (3) to make grants of 1425*l.* and 1000*l.* a year respectively to two institutions in aid of the faculty of engineering; (4) to appoint and pay the regular staff of teachers in the London School of Economics; (5) to reserve 800*l.* a year pending negotiations with the London County Council as to the establishment of a day training college.

A scheme for establishing advanced courses of study on physiology in the University buildings has been approved by the Senate, and 400*l.* has been voted to meet the donation of 2000*l.* by Mr. Walter Palmer.

From the *British Medical Journal* we learn that each course will consist of not less than eight lectures, or will extend over at least eight weeks, and attendance will be open without fee to students of the University and to other persons approved by the principal. It is recognised to be essential to the success of such lectures that they should immediately proceed from laboratory work, and be in a large measure demonstrative of current research. It is, therefore, necessary that the University lecture-room should be supplied by preparations and work-rooms in which current research will be actually prosecuted. It is hoped that from the outset the University lecturers and other physiologists may be able to prosecute research in these accessory rooms, and it is strongly felt that official recognition and provision for research is in several ways essential to success, first, as a corrective of a purely verbal and didactic type of lecture, and secondly, as being calculated to stimulate the intellectual interest of University lecturers and other students. Further, the working of the scheme will afford at a relatively small cost evidence on the point whether a larger scheme for the establishment of a central institute of physiology and experimental psychology will be practicable in the future.

It is proposed that the list of annual courses of lectures shall be prepared and advertised during the preceding year, and candidates for the honours school in physiology will be permitted to nominate any two subjects on the published list for the special practical examination. The provisional arrangements are as follows:—

The first course, to begin in May, will be given by Dr. Leonard Hill, F.R.S., on the circulation. Dr. A. D. Waller, F.R.S., will give a double course, on (*a*) signs of life, (*b*) animal electricity. Prof. E. H. Starling, F.R.S., will begin a course, on the sources of animal energies, in October, and Dr. M. S. Pembrey a double course on (*a*) heat, (*b*) respiration.

The arrangements for 1903 are provisionally as follows:—January, Prof. W. D. Halliburton, F.R.S., on proteids, and Prof. W. M. MacDougall, on sense organs; May, Dr. G. A. Buckmaster, on the blood; and Prof. J. Bretland Farmer, F.R.S., on vegetable cytology; in October, Dr. F. W. Mott, F.R.S., on the central nervous system, and Prof. W. R. Dunstan, F.R.S., on a subject not yet announced.

NOTES.

THE determination of the fundamental unit of electrical resistance by the late Principal Viriamu Jones ranks among the most important of such determinations, and justly acquired for him a foremost position among physicists. This determination was carried out by means of a modification of the Lorenz method, and a machine for the purpose, on which he spent 400*l.*, was erected by Principal Jones at the University College at Cardiff. He was, however, of opinion that improvement was possible, and accordingly the Drapers' Company, in 1898, in recognition of his signal services both to science and to education, voted to him the sum of 700*l.* for the construction of more perfect apparatus. This apparatus he proposed ultimately to set up at the National Physical Laboratory, where preparation had been made to receive it. His illness and death prevented the realisation of these hopes, but the Drapers' Company have, with great generosity, and with a view of showing their appreciation of his merits, confirmed their vote and announced their intention of putting the sum of 700*l.* at the disposal of the committee of the Laboratory for the complete equipment of a Lorenz apparatus as a memorial to Principal Jones. The apparatus is to be erected under the supervision of Prof. Ayrton, F.R.S., and the director. This valuable gift has been accepted by the committee of the Laboratory; a tablet will be affixed to the apparatus stating that it was presented by the Drapers' Company in memory of Principal Viriamu Jones and in recognition of his great scientific attainments.

THE annual meeting of the Institution of Naval Architects will be held on Wednesday, March 19, and the two following days. The Earl of Glasgow, president, will occupy the chair. On behalf of the members of the Institution, the council has accepted an invitation to take part in the summer meeting of the Schiffbau Technische Gesellschaft, which is to be held in Düsseldorf on June 2. There will be no regular summer meeting of the Institution this year.

WE much regret to see the announcement of the death of Mr. A. W. Bennett, lecturer on botany at St. Thomas's Hospital, and the author of a number of books and papers on botanical subjects. Mr. Bennett was for several years the subeditor of NATURE, and was an occasional contributor to these columns up to the time of his death, on January 23. He was sixty-eight years of age.

A MEMORIAL tablet is about to be placed in Harpenden Parish Church bearing the following inscription:—"In affectionate memory of Sir John Bennet Lawes, Bart., F.R.S., born at Rothamsted, December 28, 1814, died at Rothamsted, August 31, 1900. He used his long life and his great knowledge and experience as an agricultural chemist, and as a practical and scientific farmer, in the pursuit of truth, and for the benefit of his fellow men in his own country and in all parts of the world. This tablet is erected by the parishioners of Harpenden and others who deeply feel his loss as an example and friend."

THE Wellington correspondent of the *Times* states that at a public dinner given to the officers and men of the *Discovery* by the Philosophical Institute of Canterbury and the citizens of Christchurch, a number of interesting speeches were made. Captain Scott, who was loudly cheered, replying to the toast of "The *Discovery* Antarctic Expedition," said it was their intention to pass down the 175th meridian a little to the eastward of New Zealand. Then they hoped to pass down the east coast of Victoria Land, leaving records of what they had done. These records could be picked up by any relief expedition that might follow them. Next they would go to the south of

Victoria Land through those regions which Sir Thomas Ross discovered in 1840, and which they hoped to explore. They also hoped to pass along the ice barrier that stretched for 300 or 400 miles to the eastward. Then they would pass into the region of the unknown. When they returned to New Zealand, probably in two years' time, they might come back as beggars, for, though they had provisions and outfit for a three-years' cruise, wages and other things had been arranged for two years only.

THE following official statement of the plans of the Carnegie Institution (see p 278) is given in *Science*:—"It is proposed to found in the city of Washington, in the spirit of Washington, an institution which, with the cooperation of institutions now or hereafter established, there or elsewhere, shall, in the broadest and most liberal manner, encourage investigation, research and discovery, encourage the application of knowledge to the improvement of mankind; provide such buildings, laboratories, books and apparatus as may be needed, and afford instruction of an advanced character to students whenever and wherever found, inside or outside of schools, properly qualified to profit thereby. Among its aims are these: (1) To increase the efficiency of the universities and other institutions of learning throughout the country, by utilising and adding to their existing facilities, and by aiding teachers in the various institutions for experimental and other work, in these institutions as far as may be advisable. (2) To discover the exceptional man in every department of study, whenever and wherever found, and enable him by financial aid to make the work for which he seems specially designed, his life work. (3) To promote original research, paying great attention thereto, as being one of the chief purposes of this institution. (4) To increase facilities for higher education. (5) To enable such students as may find Washington the best point for their special studies to avail themselves of such advantages as may be open to them in the museums, libraries, laboratories, observatory, meteorological, piscicultural and forestry schools and kindred institutions of the several departments of the Government. (6) To ensure the prompt publication and distribution of the results of scientific investigation, a field considered to be highly important. These and kindred objects may be attained by providing the necessary apparatus, by employing able teachers from various institutions in Washington and elsewhere, and by enabling men fitted for special work to devote themselves to it, through salaried fellowships or scholarships, or through salaries, with or without pensions in old age, or through aid in other forms to such men as continue their special work at seats of learning throughout the world."

ALL the international balloon ascents which took place in Europe on the morning of December 5, 1901, were made in an extensive area of high barometric pressure, the centre of which lay over Germany. Two recording balloons were sent up from Trappes (near Paris); one reached 14,380 m., lowest temperature − 72°·9 C. (on ground − 1°); the other reached 14,900 m., lowest temperature − 75°·8 (on ground − 3°). The Strassburg balloon rose to 6580 m., minimum temperature − 30°·5 (on ground − 2°). From Berlin two recording balloons were sent up; at 7634 m. − 38°·7 was registered (on ground − 5°·4); at 9606 m. − 52°·8 was recorded (on ground − 4°). Two manned balloons also ascended. From Vienna − 40° was recorded at 6920 m. (on ground 1°). A manned balloon was also sent up. From Pavlovsk (near St. Petersburg) the greatest height attained was 3120 m., minimum temperature − 14°·7 (on ground − 11°). Mr. Rotch also sent up kites from Blue Hill Observatory in the afternoon. Temperatures of − 9°·9 at 1343 m. and − 9° at 800 m. were recorded. The kites remained up for two hours.

THE current number of the *Nineteenth Century* contains an instructive article on "The Reduction of Town Fogs," by the Hon. Rollo Russell. The author, who has for many years made a special study of the subject, divides fogs, so far as London is concerned, into four classes:—(1) Damp fog or mist with much cloud, from the ground up to about 1000 feet. Dust particles not numerous, and town clearer than country. (2) Damp fog or mist, dense in country. This type may be slight in London, especially if the fall of temperature has not been great. In mid-winter the fog tends to increase during the daytime in town, while in the country it rapidly dissolves. (3) Dense dry fog, with low temperature following a very cold night. It is anticyclonic in character, and the lowest strata of air are much colder than the strata at 500 to 1000 feet. Fogs of this kind are the most serious and most frequent in London; their approach can usually be foretold. (4) Occasionally a fog occurs after a severe frost, when a warm southerly wind displaces the cold air near the surface. This fog is most dangerous to traffic, being the densest. It is the least damaging to health, and may not reach more than 50 feet above the ground. The author considers that the need of the day is not so much scientific inquiry as administrative regulation, by which dark fogs might be reduced to almost harmless proportions. The preparation of forecasts is useful, as in the case of storms. Observations of the upper clouds are especially valuable in the prediction of fogs, but in London these clouds cannot always be seen; in such cases valuable data could be obtained by sending up a small balloon, with recording thermometer and hygrometer.

THE Meteorological Office pilot chart of the North Atlantic and Mediterranean for the month of February shows that very little ice was reported in the neighbourhood of Newfoundland during December, the latest date being the 11th, when a berg was seen not far from Cape Race. The Belle Isle route being closed for the winter, there were no reports from that region. Northward of Iceland unusually heavy ice has been seen. With regard to the paths of cyclonic disturbances, it is pointed out that on the eastern side of the Atlantic storm centres may be fallen in with, not only near the Azores, but even southward of the latitude of the Canaries. These, however, are much more erratic in their movements than those of the more northern ones, so that at times the changes of wind and barometer seem to be subject to no rule. On the western side of the ocean there are areas where the gale frequency this month is from 25 to nearly 40 per cent. of the wind records, the February storms being amongst the most violent and disastrous experienced in the course of the year, the exceptionally severe weather of February, 1899, being referred to as an illustration. This is the period of least fog about the banks of Newfoundland, the area of slightly more than 10 per cent. frequency being limited to a narrow strip across the southern extremity. The "smokes" of the Bight of Benin are mentioned, and it is stated as an unusual occurrence that a very dense fog visited Abaco Island, Bahamas, in February, 1901, dwellings being invisible at a distance of 100 feet. The remarks on currents deal with Rennel's Bay of Biscay current and the variations in the velocity of the Gulf Stream according to the time of day and of the lunar month, the daily maximum variation of strength being nearly 2 knots an hour and the mean daily variation about 1½ knots. In heavy gales on the coast of North Carolina strong local currents are set up which completely mask the tidal streams. Two inset charts illustrate the easterly and northerly types of weather over western Europe at this season, and the paths of Mediterranean disturbances are dealt with.

SOME years ago Prof. J. W. Moll made experiments on the effect of forcing water into cut stems; this was managed by tying the shoot into the short arm of a U tube, containing water, and pouring mercury into the long arm. The method is still used for demonstration purposes, but it has certain disadvantages. One of these—namely, the fact that the pressure diminishes as the water passes into the plant—the author now proposes to remove by the use of the apparatus described in a paper on the hydrosimeter (Amsterdam Academy of Sciences, vol. iv., November 1901). The arrangement by which this is effected is simple and practical, and may no doubt be useful in other cases where it is desired to subject a plant to prolonged and constant pressure. The paper is illustrated by a drawing of the apparatus, and has the merit of being written in English.

Light electric motor carriages, or "runabouts" as the Americans have termed this type of vehicle, were a feature of the recent exhibition of automobiles held in New York. According to the *Electrical World and Engineer*, the Electrical Vehicle Co. of New York was represented by a light car of this type weighing only 394 kg. and provided with a battery of the new Exide cell, capable of driving the carriage 64 km. at a speed of 22 km. per hour. The American Bicycle Co. exhibited an electrical carriage weighing 450 kg. The battery in this case was composed of thirty cells, and was of sufficient power to drive the vehicle for four hours at the rate of 27 km. per hour. The Baker Motor Vehicle Co. showed a light "Stanhope" weighing 405 kg., provided with a battery of ten Planté cells, capable of driving the carriage 64 km. on one charge. The battery weighed 140 kg. It would have been interesting to know the average life of the plates in these batteries under normal road and running conditions, but upon this crucial point nothing is said in the report before us. In large towns, where several generating stations exist, and where the recharging of exhausted batteries is a comparatively simple affair, we believe there is a useful future before this type of motor-vehicle.

Prof. P. Zeeman, in a paper recently read before the Amsterdam Academy of Sciences, (November 30, 1901), stated that he had been investigating the limits of resolving power attainable by means of the Michelson Echelon grating spectroscope, with an instrument consisting of thirty plates, each 7·8 mm. thick, set at steps of 1 mm. Testing by means of light sources in magnetic fields of gradually increasing intensities, he found that the resolving power was almost equal to its theoretical value.

In a paper on the energy of the universe in the *Revue scientifique*, M. I. Skvortzow discusses the influence of electrical phenomena in cosmogony. He considers that in the past history of the earth, and of other celestial bodies, electrical and chemical energy have originally played the most important part, and that heat energy has become more and more important in proportion as the earth has assumed a more material form, so that the more its energy has passed from the dynamic to the static form the greater has been the absorption of dynamical energy in overcoming resistances. The heat of the earth M. Skvortzow attributes to electric currents circulating mostly near the surface; the interior of the earth, on the other hand, he thinks may be as cold as the greatest depths of the ocean. Changes in the aspect of the earth, as well as meteorological phenomena, are attributed to electric currents induced by solar influence. The temperatures of different planets are considered to depend less on their distance from the sun than on their reserve of energy and on the currents which the sun induces in them in virtue of their axial and orbital motions. Will this theory of the electromagnetic origin of the earth's heat reconcile the two opposing views on the age of the earth?

The somewhat heated controversy which ensued at the beginning of last year on the occasion of the starting of the London United Tramway's electrical system has borne after-fruit in the paper on earth currents derived from distributing systems which was read last Thursday before the Institution of Electrical Engineers by Mr. E. B. Wedmore. The author treated the subject of the magnetic disturbance caused by the currents leaking from the rails of a rail-return tramway system from a mathematical and practical point of view, and also discussed briefly the electrolytic troubles that may arise. To judge by the paper itself and the discussion, which was of a very quiet nature, the whole subject is in need of further investigation. This applies, perhaps, more particularly to the question of the electrolysis of gas and water pipes. With most of the speakers it seemed to be an article of faith that the leakage currents under Board of Trade rules will not do any damage worth considering, but experimental evidence, which is doubtless very difficult to procure, is wanting. There still remains to be explained the presence of the fifteen amperes which were found flowing in the London United Tramways' rails before the system had started electrical working, and it is not to be wondered at if facts such as these make gas and water engineers feel uncomfortable. Another point brought out by two speakers is worthy of notice; the term earth currents has for long definitely meant the cosmic phenomena, and should not be applied to the leakage currents from tramways, or else confusion is sure to result.

The Dumoulin process for the electro-deposition of copper in the form of tubes does not appear to have been very successful at Widnes, where a works for operation of this process was built in 1896–1897. According to the fifth annual report of the Electrical Copper Co., it has been decided to close the works permanently and to sell the plant, since at no period of its operation has a profit been earned. This failure to earn profits is ascribed, to the small output—only thirty tons per month, to the high price of fuel, and to the heavy interest charged on the loans raised by the company. The directors in their last report, however, still speak confidently of the value of their patents (which stand in their balance-sheet at 405,000*l.*), and negotiations are to be opened for the sale of these to refiners able to work the process on a larger scale of operations. We may remind our readers that the Dumoulin process depends upon the electro-deposition of copper upon revolving mandrils; specially treated strips of skin being used to supply the friction necessary for obtaining smooth and dense deposits. The process differs from the well-known Elmore process chiefly in this substitution of skin for agate burnishers; and it is noteworthy that in neither case has the financial success realised the early expectations of the promoters of the companies operating these processes.

A report on the Rampur coal-field, which lies in the Central Provinces of India, north-west of Sambalpur, has been prepared by Mr. G. F. Reader (*Mem.* Geol. Survey, India, vol. xxxii. part ii.). A good steam coal, 7 feet 10 inches thick, and two other seams of workable coal, have been proved to exist. Their extension has, however, to be determined.

We have received from Mr. A. Gibb Maitland, Government Geologist, the annual progress report for 1900 of the Geological Survey of Western Australia. A detailed geological map of Kalgoorlie has been prepared and will be published together with a full report on the geology of this important mining centre. The lodes are for the most part bands of basic rocks, which are characterised by strong foliation, by the alteration of amphibole into chlorite and carbonates of iron, lime, manganese and magnesia, and, finally, by the development of secondary silica, mica, pyrites, gold, tellurides of gold, &c. There are no grounds for believing that the mines of Kalgoorlie have reached the limit of ore deposition, or that the lodes will not prove productive in depth. Reports on other metal-mining districts have been made; attention has been given to the possible extension of artesian water-bearing strata, and also to borings in search of coal near Albany, where in all cases the floor of older crystalline rocks was reached without evidence of coal-bearing strata.

FROM the Iowa Geological Survey, which is under the direction of Dr. Samuel Calvin, State Geologist, we have received the eleventh volume, comprising the annual report and accompanying papers for 1900. The papers are brief memoirs on seven counties, in which the geology is described, typical sections are noted in detail, fossils are recorded, particulars are given of economic deposits and soils, and the papers are admirably illustrated. The Survey is carried on with evident vigour and ability. Special reports on coal, artesian wells, lead and zinc ores have already appeared. Dr. S. W. Beyer, one of the special assistants, has now in preparation a monograph on Iowa clays, and others are working at the materials suitable for the manufacture of Portland cement. We are informed by Dr. Calvin that the demand for the publications of the Survey has, so far as the earlier volumes are concerned, exceeded the supply. Yet much ignorance prevails, and samples of yellow mica or iron pyrites are received almost weekly from persons who imagine they have discovered gold in Iowa; and an important part of the survey work is to prevent useless explorations for geological products.

THE *American Naturalist* commences the year well, some of the articles in the January number being of more than usual interest. Among them is one by Dr. R. W. Shufeldt, on the habits of kangaroo-rats in captivity, illustrated by a couple of excellent photographs of these curious little American rodents, taken by the author from life. The specimens, three in number, which Dr. Shufeldt had under observation belonged to the species known as *Perodipus richardsoni*, and became quite tame after a few days in confinement. "They hopped about," he writes, "with great agility on their hind pair of kangaroo-like legs, while the little short pair of anterior limbs were curled inwards on the chest. . . . They are able climbers, and the rapidity with which they can dig a burrow in ordinary ground is astonishing. They use the fore-feet to perform the digging part and the long and strong hind-legs to kick the loosened soil out of their way behind, as it accumulates every moment or so. In soft soil one of these little mammals can put itself out of sight in less than a minute by digging." It is added that kangaroo-rats are in the habit of turning their cheek-pouches inside out in order to clean them. In another article in the same journal, on the best method of mounting fishes for museum-exhibition, Mr. S. E. Meek pronounces in favour of quadrangular glass-vessels, in which the specimens, after being painted on the side to be shown with water-colours, are placed in alcohol as if swimming. It is added, however, that this method, although the best yet devised, is by no means perfect, and discussion is invited from experts in the hope that a more satisfactory way of exhibiting these animals may be devised.

A POPULAR account of the principles and performances of telegraphy without intervening wires is given by Mr. S. R. Bottone in his little book on "Wireless Telegraphy and Hertzian Waves," the second edition of which has been published by Messrs. Whittaker and Co. The first edition was noticed in NATURE of September 27, 1900 (vol. lxii. p. 522).

IN the letter on the influence of temperature on the action of nitric acid on metals, which appeared in NATURE of December 12, 1901, the words "the temperature abruptly rising from 80° C. to as much as 104° C." were printed as received from Dr. A. J. Ewart, who, however, now informs us that they should read "the temperature abruptly rising *to* from 80° C. to as much as 104° C."

A SECOND edition, revised and extended, of Dr. S. Rideal's work on "Water and its Purification" has been published by Messrs. Crosby Lockwood and Son. The original edition was reviewed in these pages on April 29, 1897 (vol. lv. p. 602), and the book remains substantially the same, though changes have been made in the chapter on the characters of natural waters, and there are several additions dealing with recent water epidemics and with sand filtration. It is a little surprising to find in a scientific book that the employment of a dowser or "water-finder" is suggested, and the cautious remark is made with reference to water-finding that "if further research should discover a physical law underlying the process, its utility would become more certain and extended." The same remark could just as reasonably be made of astrology, chiromancy, or any other process of divination.

A CATALOGUE of protected rheostats, measuring instruments and electrical apparatus relating to them has been issued by Messrs. Isenthal and Co. The rheostats have been devised to economise space on switchboards and elsewhere and to minimise the chances of short circuit. In the Electra Rheostats (Schindler-Jenny's patents) the resistance wires are embedded in a highly refractory, insulating material, and a protecting sheet of metal is cast around the latter. Instruments constructed upon this plan do not possess the defects commonly found in other embedded rheostats, and they are particularly suitable as motor-starting rheostats for continuous and rotary current. The Dimmer switches, also included in Messrs. Isenthal's list, provide a means of moderating the light of electric incandescent lamps. By means of a reducing rheostat in the switch the light of an electric lamp connected with it may be given four degrees of brightness, from the dimness of a night light to full luminosity. The measuring instruments include several types of voltmeters, ampèremeters, and cell testers, for workshop and laboratory use.

THE twenty-third communication from the laboratory of van 't Hoff to the Prussian Academy of Sciences, on the conditions of formation of the oceanic salt deposits, contains a summary of the results obtained from the investigation of solutions saturated at 25° C. with sodium chloride and containing the chlorides and sulphates of magnesium and potassium. As the result of this series of researches, the conditions of existence of a large number of the Stassfurt salts in contact with aqueous solutions, and inversely the conditions necessary for the separation of these salts from the mother liquors, have been accurately established. The salts or minerals for which these valuable data have been obtained are—bischofite, sylvine, thenardite, carnallite, glaserite, astrakanite, reichardtite, kieserite, schönite, leonite and kainite, all of which may separate from solutions at 25° C. The two salts langbeinite and löweite are apparently not capable of existence in contact with solutions at this temperature, and their occurrence in the Stassfurt layers points to the prevalence of a higher temperature than 25° C. in the formation of these natural deposits.

THE additions to the Zoological Society's Gardens during the past week include a Rhesus Monkey (*Macacus rhesus*) from India, presented by Mr. C. Hunterbrocken; a Patas Monkey (*Cercopithecus patas*) from West Africa, presented by Mr. A. Richmond; two Sharpe's Wood Owl (*Syrnium nuchale*), a White-throated Monitor (*Varanus albigularis*) from West Africa, presented by Mr. William Cross; a Bengalese cat (*Felis bengalensis*) from the East Indies, two Egyptian Geese (*Chenalopex aegyptiacus*) from Africa, an Anaconda (*Eunectes murinus*) from South America, a Black Sternothere (*Sternothaerus niger*) from West Africa, deposited; a Barasingha Deer (*Cervus duvaucelli*) from the Himalayas, received in exchange.